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Unuk River King Salmon Stock Status and Action Plan, 2018

by

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and

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March 2018

Alaska Department of Fish and Game **Division of Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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The Regional Information Report Series was established in 1987 and was redefined in 2007 to meet the Division of Commercial Fisheries regional need for publishing and archiving information such as area management plans, budgetary information, staff comments and opinions to Alaska Board of Fisheries proposals, interim or preliminary data and grant agency reports, special meeting or minor workshop results and other regional information not generally reported elsewhere. Reports in this series may contain raw data and preliminary results. Reports in this series receive varying degrees of regional, biometric and editorial review; information in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author or the Division of Commercial Fisheries if in doubt of the level of review or preliminary nature of the data reported. Regional Information Reports are available through the Alaska State Library and on the Internet at: http://www.adfg.alaska.gov/sf/publications/.

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ABSTRACT

In response to guidelines established in the *Policy for Management of Sustainable Fisheries* (SSFP), the Alaska Department of Fish and Game (department) recommended that the Unuk River king salmon (*Oncorhynchus tshawytscha*) stock be designated as a "stock of management concern." A "management concern" is defined as "a concern arising from a chronic inability, despite use of specific management measures, to maintain escapements for a salmon stock within the bounds of the SEG [sustainable escapement goal], BEG [biological escapement goal], OEG [optimum escapement goal], or other specified management objectives for the fishery." Escapement of Unuk River king salmon has fallen below the lower bound of the existing BEG (1,800 to 3,800) in 5 of the past 6 years (2012 to 2016), including the preliminary estimate for 2017 (1,203). Since 2014, the department has implemented conservative management measures to reduce harvest of Unuk River king salmon and increase escapement. These management measures have thus far proven insufficient to consistently achieve the BEG. This action plan report provides stock assessment and management background information and presents management measures adopted by the Alaska Board of Fisheries at the January 2018 Southeast and Yakutat regulatory meeting to reduce harvest of Unuk River king salmon in commercial, sport, and personal use fisheries.

Key words: action plan, king salmon, Oncorhynchus tshawytscha, Unuk River, Southeast Alaska, stock of concern, fishing, sustainable salmon fisheries policy, Alaska Board of Fisheries.

INTRODUCTION

The *Policy for Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222) directs the Alaska Department of Fish and Game (department) to provide the Alaska Board of Fisheries (board) with reports on the status of salmon stocks and identify any salmon stocks that present a concern related to yield, management, or conservation during regularly-scheduled board meetings. This report provides the department's assessment of the Unuk River king salmon (*Oncorhynchus tshawytscha*) run as a stock of management concern and outlines management measures adopted by the board to reduce harvest. Criteria that must be met for future removal of the stock of concern designation are also presented, as well as historical and ongoing stock assessment information and the existing regulations and emergency order (EO) authority the department employs to manage for the Unuk River king salmon escapement goal.

In September 2017, the department recommended to the board that the Unuk River king salmon run be designated as a stock of management concern[1]. This recommendation was based on guidelines established in the SSFP, which describes a management concern as "a concern arising from a chronic inability, despite use of specific management measures, to maintain escapements for a salmon stock within the bounds" of the established escapement goal whether it be a sustainable escapement goal (SEG), biological escapement goal (BEG), or optimal escapement goal (OEG), or other specified management objective. Chronic inability is further defined in the SSFP as the "continuing or anticipated inability to meet escapement thresholds over a 4 to 5-year period, which is approximately the generation time of most salmon species." Unuk River king salmon escapements were below the lower bound of the current BEG range of 1,800 to 3,800 large fish (king salmon $\geq$ 660 mm mid-eye to fork of tail length, primarily age 1.3 and older), in 5 out of the past 6 years from 2012 to 2017. The board designated the Unuk River king salmon run as a stock of management concern at their October 2017 work session, following the department's recommendation. In December 2017, the department provided a draft action plan for consideration by the board and public that included various options to reduce harvest of Unuk River king salmon in the commercial, sport, and personal use fisheries. The board reviewed

[1] Unpublished memorandum from S. Kelley and T. Brookover, ADF&G, to Alaska Board of Fisheries, 29 September 2017.

those options at the January 2018 Southeast and Yakutat regulatory meeting and adopted the final action plan presented in this report.

STOCK ASSESSMENT BACKGROUND

The Unuk River is a glacial system which flows into Behm Canal near Ketchikan, Alaska (Figure 1). The Unuk River is one of 4 Southeast Alaska (SEAK) king salmon stocks for which a full stock assessment is performed on an annual basis by the department. This includes coded-wire-tagging juveniles and smolt, which provides estimates of smolt abundance and estimates of harvest by gear, area, and time in mixed stock commercial and sport fisheries. Coded-wire tagging of this stock has occurred from 1982 to 1986 and 1992 to present. These data paired with spawning abundance estimates allow for the estimation of marine (smolt-to-adult) survival, total return (escapement plus harvest by age), and calendar year harvest and brood year exploitation rates for the Unuk River stock.

Estimates of escapement are germane to large spawners and are based on mark-recapture (MR) estimates of total escapement from 1997 to 2009 and in 2011, and expanded observer index counts using helicopter and foot surveys from 1977 to 1996 and from 2010 to present. Radio telemetry studies conducted in 1994 and 2009 indicated that aerial and foot surveys covered 80% of the spawning area. Seven years of concurrent MR estimates and survey counts were used to estimate a survey expansion factor of 4.83 (SE = 0.59) (Hendrich et al. 2008).

Coded-wire tag recoveries of this stock indicate that fish rear in a wide geographic area, including SEAK, Gulf of Alaska, Bering Sea, and to a lesser extent in Northern British Columbia. The waters of Behm Canal adjacent to the Unuk River are currently closed to king salmon fishing by both sport and commercial fisheries. Immature and mature fish are harvested in marine mixed stock fisheries in SEAK and northern British Columbia (Table 1).

ESCAPEMENT

From 1977 to 2011, the Unuk River met or exceeded the lower bound of the BEG every year. From 2012 to 2017, the Unuk River missed the lower bound of the BEG in 5 of 6 years, despite restrictive actions taken in the sport and commercial fisheries since 2014 (Table 1).

HARVEST

Unuk River king salmon are harvested in various commercial and sport fisheries. Over the 10-year period 2007–2016, the average harvest rate of Unuk River king salmon was 41% (range 21–71%; Table 1). Average harvest rate broken down by fishery was 26% commercial troll, 10% commercial net, and 5% sport for the same 10-year period. If harvest rates were more consistent to those seen for other SEAK wild king stocks (i.e., ~20%), escapement would have been achieved in 4 out of the past 5 years (2012–2016). The commercial harvest (all fisheries combined) over the last 10 years (2007–2016) was dominated by commercial troll fisheries including winter, spring, and summer fishing periods. Most troll harvest occurs in the spring fishery. The commercial net fisheries include Southeast drift gillnet and purse seine fisheries. The sport harvest occurs primarily from May through July, except in recent years (2014–2016) when restrictive measures were in place for the sport fishery in terminal areas near Ketchikan, which lowered the average sport harvest rate to 3% during this timeframe.

ESCAPEMENT GOAL EVALUATION

ESCAPEMENT GOAL HISTORY

The *Policy for Statewide Salmon Escapement Goals* (SSEGP; 5 AAC 39.223), adopted by the board in 2001, established the formal process for setting escapement goals. Prior to this the department escapement goal policy required publication of the goals (Fried 1994). In 1994, the department established an escapement goal of 875 large spawners based on peak observer index counts. In 1997, the escapement goal was revised to an escapement goal range of 650 to 1,400 large spawners (McPherson and Carlile 1997) based on peak observer index counts. Using more robust methods and a longer time series of spawner and recruit data including the 1982 to 2001 brood years (Hendrich et al. 2008), the current BEG range of 1,800 to 3,800 large spawners was established and adopted by the department in 2009.

SPAWNER DATA AND BEG ANALYSIS

The SSEGP along with the SSFP require the department to report on salmon stock status and escapement goals to the board on a regular basis, document and review existing salmon escapement goals, establish goals for stocks for which escapement can be reliably measured, and prepare scientific analyses with supporting data when goals are created, modified, or recommended for elimination.

ESCAPEMENT GOAL RECOMMENDATION

The department has reviewed salmon escapement goals every 3 years prior to the Southeast and Yakutat board meeting and has not changed the Unuk River king salmon escapement goal since 2009 (Der Hovanisian et al. 2011; Heinl et al. 2014; Heinl et al. 2017).

STOCK OF CONCERN RECOMMENDATION

Inseason management measures were taken annually since the 2014 fishing season to reduce harvests of Unuk River king salmon and to pass fish to escapement; however, these efforts proved insufficient to achieve the BEG such that escapements have fallen below the BEG in 5 of the past 6 years. Therefore, in October 2017, the department recommended that the board designate the Unuk River king salmon a stock of management concern, based on guidelines established in SSFP (5 AAC 39.222).

OUTLOOK

The department produces preseason forecasts by December 1 for the Situk, Chilkat, Taku, Stikine, and Unuk river stocks of king salmon in SEAK. For the Unuk River stock of king salmon in 2018, the forecast uses sibling models in which the 2016 and 2017 estimated total returns of fish from brood years (BY) 2012 and 2013 were used to predict the returns of age-1.5 (BY2013) and age-1.6 (BY2012) fish in 2018. The forecast uses the relationships observed in Unuk River king salmon age classes over the past 9 years. The Unuk River total run forecast is 863 large fish, which, even if no fish are harvested, is below the lower bound of the escapement goal range of 1,800 to 3,800 large spawners.

HABITAT ASSESSMENT

The Unuk River originates in a heavily glaciated area of northern British Columbia and flows for 129 km where it empties into Alaska at Burroughs Bay, 85 km northeast of Ketchikan. The Unuk River drainage encompasses an area of approximately 2,570 km^2 (Geospatial Data Gateway http://datagateway.nrcs.usda.gov [Accessed 11/13/2017]). There is no road access to any portion of the watershed, restricting anthropogenic impacts. The lower 39 km of the Unuk River are in Alaska. The U.S. portion of the Unuk River contains 6 tributaries in which more than 80% of the king salmon spawning occurs. The entire U.S. portion of the Unuk River watershed is within the Misty Fiords National Monument Wilderness. This land-use designation contributes to the pristine condition of the watershed and salmonid habitat still observed today in the U.S. portion. The anadromous portions of the 6 primary king salmon spawning tributaries were surveyed using standardized habitat surveys developed by the U.S. Forest Service (USFS) and modified by the Division of Sport Fish in 2002–2004 (Nichols et al. 2013). These surveys characterized the geomorphic, fluvial, and riparian attributes of the primary spawning areas in the lower portion of the watershed as baseline information to be compared with other surveyed systems throughout SEAK.

The British Columbia portion of the watershed similarly hosts mostly pristine terrestrial and aquatic habitat. One currently planned development project, the Kerr-Sulphurets-Mitchell (KSM) mine, is currently being evaluated and could have future impacts on downstream water quality and other components of anadromous habitat (e.g., water flow, physical habitat, etc.). The proponents of this project propose to mine the Sulphurets, Kerr, Mitchell, and Iron Cap deposits, establish mine support facilities in the non-fish bearing Mitchell and McTagg Creek valleys, and store and treat contact water before discharging the effluent into Sulphurets Creek, which drains into the Unuk River. Alaska and British Columbia have different regulatory measures in place to protect fish habitat, including water quality, riparian habitat, and other components. At this time, it would be impossible to estimate the potential effects of this specific project on the Unuk River king salmon population; however, efforts are currently being proposed to collect baseline water quality and quantity data, including a desire to implement periodic monitoring efforts in the watershed to assess any impacts that may result from this mining project.

FISHERY MANAGEMENT OVERVIEW AND BACKGROUND

The Southeast Alaska king salmon fishery is managed to achieve the annual all-gear allowable catch determined from the preseason abundance index (AI) generated by the Chinook Technical Committee of the Pacific Salmon Commission each spring. The catch is allocated through regulations established by the board among troll, net, and sport fisheries (Table 2).

COMMERCIAL FISHERIES

Purse Seine fishery: Regulations allow purse seine fishing in Districts 1 (Sections 1-C, 1-D, 1-E, and 1-F only), 2, 3, 4, 5, 6 (Sections 6-C and 6-D only), 7, 9, 10, 11 (Sections 11-A and 11-D only), 12, 13, and 14. Purse seine fishing is also allowed in hatchery THAs at Neets Bay, Kendrick Bay, Anita Bay, Deep Inlet, and Hidden Falls (Figure 2). Although the areas specified above are designated purse seine fishing areas, specific open areas and fishing times are established inseason by EO.

Drift gillnet fishery: Drift gillnet fisheries are conducted in 5 traditional fishing areas (Figure 3): Tree Point and Portland Canal (District 1); Prince of Wales (District 6); Stikine (District 8); Taku/Snettisham (District 11); and Lynn Canal (District 15). In addition, drift gillnet fisheries occur in hatchery THAs adjacent to hatchery facilities and at remote release sites throughout the region. Although the THAs are designated drift gillnet fishing areas, specific open areas and fishing times are established inseason by EO.

Troll fishery: The commercial troll fishery in Southeast Alaska and Yakutat (Region 1; Figure 4) occurs in State of Alaska waters and in the Federal Exclusive Economic Zone (EEZ) east of the longitude of Cape Suckling (5 AAC 29.010 and 5 AAC 29.020). All other waters of Alaska are closed to commercial trolling.

There are 3 commercial troll seasons in Southeast Alaska, winter, spring, and summer. The winter troll fishery is managed for a guideline harvest level (GHL) of 45,000 non-Alaska hatchery-produced king salmon, with a guideline harvest range of 43,000−47,000 non-Alaska hatchery-produced fish, plus the number of Alaska hatchery-produced king salmon. The winter fishery is conducted from October 11 through April 30 or until the GHL is harvested. Following the closure of the winter troll fishery, and prior to June 30, spring troll fisheries open by EO to target Alaska hatchery-produced king and chum (*O. keta*) salmon and are conducted in migration corridors or adjacent to hatchery release sites (Figure 5). Terminal area fisheries occur directly in front of hatcheries or at remote release sites. Most of the annual troll king salmon harvest is taken during the general summer troll fishery, beginning July 1, when salmon may be taken throughout most of the Southeast Alaska/Yakutat region, including the outside waters of the EEZ. The summer troll king salmon harvest is divided into 2 retention periods. The first retention period targets 70% of the remaining annual troll king allocation, after winter and spring troll non-Alaska hatchery-produced harvests are subtracted. Following the first retention period, any remaining portion of the annual troll allocation is harvested in a second king salmon retention period, which typically occurs in mid-August, and follows any closure of the troll fishery for coho salmon (*O. kisutch*) conservation.

Past Commercial Fishery Management Measures

Below is an outline of significant changes to commercial fisheries that may have affected harvest and escapement of Unuk River king salmon from 2012 to 2017:

2012:

- Fisheries were managed as outlined in the purse seine, drift gillnet, and troll management plans.

2013:

- Fisheries were managed as outlined in the purse seine, drift gillnet, and troll management plans.

2014:

Spring Troll:

- Closed the West Behm Canal, Point Alava, and Clarence Strait fisheries.

- Closed a large portion of Ketchikan area fishery and divided the remaining open waters into 3 sub-areas (Ketchikan area, Mountain Point, and West Clarence Strait) to increase level of detail in stock composition data.
- Ketchikan area and West Clarence Strait fisheries each reduced by a total of 7 days during June, compared to previous year.
- Mountain Point area reduced by 5 total days open in June from previous year.
- Sumner Strait fishery divided into 2 sub-areas (North Sumner Strait and South Sumner Strait) to increase level of detail in stock composition data.
- North Sumner Strait and South Sumner Strait areas reduced by 5 total days open in June from previous year.
- Steamer Point area openings reduced by 17 days in June from previous year.

2015:

Neets Bay THA:

- Net rotational fishing schedule modified to account for the period when Unuk River king salmon transit the area, based on coded-wire tag data. The THA closed to net gear for 4 days in statistical weeks (SW) 24–25. Expansion of the THA delayed from the second Sunday in June to July 1, which affected all gear groups.

Spring Troll:

- With preseason forecast to the Unuk River at lower end of the escapement goal range, no additional actions beyond 2014 restrictions added in 2015, number of days open during June for specified fisheries remained at 2014 level.
- Continued closure of West Behm Canal, Point Alava, Clarence Strait, and a portion of former Ketchikan (Gravina Island) area for duration of spring.

2016:

Neets Bay THA:

- Closed to net gear for 5 days in SWs 24–26. The THA closed west of the mid-bay line beginning July 1, which affected all gear groups.

Spring Troll:

- With preseason forecast to the Unuk River within the escapement goal range, no additional conservation restrictions beyond 2014–2015 actions added in 2016.
- Continued closure of West Behm Canal, Point Alava, Clarence Strait, and a portion of former Ketchikan (Gravina Island) area for duration of spring.

2017:

Neets Bay THA:

- Closed to net gear for 6 days in SWs 24–26. The THA closed to net gear on June 27 and troll gear on June 30.

Purse Seine:

- Closed to the retention of king salmon 28 in or greater beginning August 12 in all districts.

Spring Troll:

- Continued closure of West Behm Canal, Point Alava, Clarence Strait, and a portion of former Ketchikan (Gravina Island) area for duration of spring.
- Kendrick Bay reduced opening lengths to maximum of 3 days/week through SW 21.
- Stone Rock Bay reduced to 1 day/week through SW 21.
- Mountain Point reduced to 4 days/week for SWs 18–21, and reduced area beginning June 15.
- Ketchikan Area reduced to 3 days/week in SWs 18–21.
- With exception of Mountain Point, all spring fisheries located in Districts 1 and 2 closed during SWs 22–26 (May 29–June 30).
- In addition to area specific management measures during spring, a closure of all Southeast Alaska/Yakutat spring troll fisheries implemented May 29–June 14.

Summer Troll:

- King salmon retention in all troll fisheries closed for the season on August 10, and no second summer troll king retention period was opened.

SPORT FISHERIES

Unuk River king salmon are caught in the sport fishery throughout marine waters of SEAK, primarily in the Ketchikan area. King salmon fishing in freshwater is prohibited in all of SEAK east of the longitude of Cape Fairweather. Southeast Alaska regional marine sport king salmon regulations are set annually by EO as specified in the *Southeast Alaska King Salmon Management Plan* (5 AAC 47.055). These regional regulations can be modified to comply with management plans to allow increased opportunity for king salmon of Alaska hatchery origin or establish conservative regulations for the protection of wild Alaska king salmon stocks. Current sport fishing regulations protect Unuk River king salmon with a year-round closure to salmon fishing in northeastern Behm Canal and contiguous bays, combined with a seasonal salmon fishing closure in southeastern Behm Canal from May 1 to August 14.

After meeting the escapement goal for 35 consecutive years, escapements were below the goal in 5 out of the last 6 years (2012–2014, 2016–2017). In an effort to reduce harvest of Unuk River king salmon, management measures have been implemented annually since 2014 in the Ketchikan area sport fisheries. These management measures included expanding the time and area closures in West and East Behm Canal that are currently restricted by regulation, reducing the bag and possession limit in West Behm Canal to one fish through June 30, and postponing liberalization of the Ketchikan Sport terminal harvest area (THA) until July 1. In 2015, time restrictions were extended an additional 2 weeks through July 15 and after meeting the escapement goal, management measures were relaxed slightly in 2016. The escapement goal was missed again in 2016 and in response, bag and annual limits were reduced, and time restrictions were substantially extended from April 1 through August 14, 2017. Harvest rates in the Ketchikan area sport fishery on the Unuk king salmon run were 1%, 6% and 0% in 2015, 2016 and 2017, respectively. Despite the use of even more conservative measures in 2017, preliminary Unuk River king salmon escapement estimate (1,203 fish) again fell below the lower bound of the BEG.

Past Sport Fishery Management Measures

The commissioner may, by EO, change bag and possession limits and annual limits, and alter methods and means in sport fisheries (5 AAC 75.003). These changes may not reduce the allocation of harvest amongst other user groups. An EO may not supersede provisions for increasing or decreasing bag and possession limits or change methods and means specified in regulatory management plans established by the board. Below is a synopsis of sport fisheries management measures implemented to reduce harvest of Unuk River king salmon from 2012 to 2017:

2012:

- Regional king salmon regulations for SEAK applied as described in the *Southeast Alaska King Salmon Management Plan* (5AAC 47.055).

2013:

- Regional king salmon regulations for SEAK applied as described in the *Southeast Alaska King Salmon Management Plan* (5AAC 47.055).

2014:

- Regional king salmon regulations were a bag and possession limit of 3 fish 28 in or greater in length for residents and a nonresident bag and possession limit of 2 fish in May and June and 1 fish the remainder of the year 28 in or greater in length, with an annual limit of 6 fish. All anglers allowed to use 2 rods from October 1 through March 31.
- EO issued to:
    - close Northern Behm Canal to king salmon fishing May 27–June 30;
    - reduce the bag and possession limit in West Behm Canal to one fish for all anglers with a nonresident annual limit of 6 fish 28 in or greater in length from May 27 to June 30;
    - postpone the opening of the Ketchikan Sport THA from June 1 to July 1; and
    - open a small terminal area within Herring Bay and Neets Bay June 1–July 31, with a bag and possession limit of 6 fish any size and no nonresident annual limit.

2015:

- Regional king salmon regulations for SEAK were a bag and possession limit of 2 fish 28 in or greater in length for residents and a nonresident bag and possession limit of 1 fish 28 in or greater in length, with a nonresident 6 fish annual limit. Resident anglers allowed to use 2 rods from October 1 through March 31.
- EO issued to:
    - close Northern Behm Canal to king salmon fishing May 26–July 15;
    - reduce the bag and possession limit in West Behm Canal to one fish for all anglers with a nonresident annual limit of 6 fish 28 in or greater in length from May 26 to June 30;
    - postpone the opening of the Ketchikan Sport THA until July 1; and
    - open a small terminal area within Herring Bay June 1–July 31, with a bag and possession limit of 6 fish any size and no nonresident annual limit.

2016:

- Regional king salmon regulations for SEAK were a bag and possession limit of 3 fish 28 in or greater in length for residents and a nonresident bag and possession limit of 2 fish in May and June and 1 fish the remainder of the year 28 in or greater in length, with a nonresident 6 fish annual limit. All anglers allowed to use 2 rods from October 1 through March 31.
- EO issued to:
    - close Northern Behm Canal to king salmon fishing May 24–June 30;
    - reduce the bag and possession limit in West Behm Canal to one fish for all anglers with a nonresident annual limit of 6 fish 28 in or greater in length, from May 24 to June 30; and
    - Ketchikan Sport THA opened by regulation.

2017:

- Regional king salmon regulations for SEAK were a bag and possession limit of 2 fish, 28 in or greater in length for residents and a nonresident bag and possession limit of 1 fish 28 in or greater in length, with an annual limit of 3 king salmon. Resident anglers allowed to use 2 rods from October 1 through March 31.
- EO issued to:
    - close Northern Behm Canal and East Behm Canal to king salmon fishing April 1–August 14;
    - reduce the bag and possession limit in West Behm Canal to one fish for all anglers with a nonresident annual limit of 3 fish 28 in or greater in length, from April 1 to August 14;
    - restrict the bag and possession limit in the Ketchikan Sport THA from April 1 to June 30 to one fish for all anglers and a nonresident annual limit of 3 fish 28 in or greater in length; and
    - open a small terminal area within Herring Bay June 1–July 31, with a bag and possession limit of 6 fish any size and no nonresident annual limit.

PERSONAL USE FISHERIES

The Unuk River lies in the Ketchikan Nonsubsistence Area and is subject to personal use regulations. In Southeast Alaska, permits are not issued for the personal use taking of king salmon, except in hatchery terminal harvest areas; however, king salmon caught incidentally during permitted personal use fishing are legally taken and possessed. The possession limit for king salmon is 2 fish. There is no personal use harvest of king salmon on record for the Unuk River. The only personal use fishery that occurs in the waters of East or West Behm Canal that takes any measurable king salmon is the McDonald Lake sockeye salmon (*O. nerka*) fishery, in Yes Bay. The Yes Bay personal use harvest averaged 10 king salmon per year since 1998, and 6 king salmon per year since 2008. This fishery is unique as fishermen target McDonald Lake sockeye salmon with gillnets in saltwater in the mouth of the inlet, well away from the mouth of the stream.

Past Personal Use Fishery Management Measures

There have been no conservative management measures taken in the personal use fisheries that may have affected harvest and escapement of king salmon returning to Unuk River, 2012–2017.

MANAGEMENT ACTION PLAN OPTIONS FOR ADDRESSING STOCK OF CONCERN

In December 2017, the department developed a draft action plan for consideration by the board and public that included management options to reduce harvest of Unuk River king salmon in each of the commercial, sport, and personal use fisheries (Appendix A). The draft plan presented 3 options for the commercial fisheries: (a) maintain status quo, (b) combination of shaping and closures, or (c) wide scale troll and THA closures. The draft plan presented 3 options for the sport fishery: (a) maintain status quo (b) reduce area open to king salmon sport fishing and reduce the bag limits and size of THAs, and (c) further reduce time and area open to king salmon sport fishing, reduce bag limits and size of the THAs. Finally, the draft plan presented a prohibition on the retention of king salmon as the only option for the personal use fishery. The board reviewed these options at the January 2018 Southeast and Yakutat regulatory meeting and, after considering input from the department and public, adopted management measures as outlined below.

Guiding principles in implementing the action plan: Notwithstanding auxiliary preseason information, elements of this action plan and selection of the various inseason management measures will be formulated based upon preseason run forecasts for the Chilkat, Unuk, Taku, Stikine, Situk rivers and will be evaluated relative to the established escapement goals for these king salmon stocks. Further changes to management measures will be based on inseason run assessment information as it becomes available **and be balanced with requirements and provisions of the Pacific Salmon Treaty and allowable harvests**.

ACTION PLAN GOAL

The goal of this plan is to rebuild the Unuk River king salmon run to consistently achieve escapements within the escapement goal range and to consistently provide reasonable fishing opportunity at more historical levels for commercial and sport fisheries.

ACTION #1: COMMERCIAL FISHERIES

Objective: Reduce the commercial harvest of Unuk River king salmon.

Background: The approach taken by the department to date has been to shape the spring troll fishery in a manner that reduces time and area (and thus harvest) in the immediate vicinity of the Unuk River and in other spring troll areas where coded-wire tag recoveries of Unuk River king salmon have occurred. In addition to the area-specific management measures implemented during spring, all Southeast Alaska/Yakutat spring troll fisheries were closed from May 29 through June 14, 2017, king salmon retention in all troll fisheries was closed for the season on August 10, 2017, and no second summer troll king retention period was opened. Measures taken in the purse seine and drift gillnet fisheries have been limited to time and area restrictions in the Neets Bay THA based on Unuk River king salmon tag recoveries and regional non-retention of king salmon over 28 in for purse seine fisheries.

Option A—Status Quo

Specific Action in the Purse Seine and Drift Gillnet Fisheries to Implement the Objective:

- Using EO authority, close Neets Bay THA for 6 days during SWs 24–27.

- Using EO authority, impose regional non-retention of king salmon over 28 in for purse seine fisheries (requires adoption of non-retention provisions attached. **See Appendix B**).

Benefits: These management measures can be accomplished through EO authority and the user groups are accustomed to the actions. The restrictions are directly related to historical coded-wire tag recovery data. The fisheries impacted by these restrictions experience minimal disruption.

Detriments: Progressive reduction of fishing time in the Neets Bay THA from 2015 to 2017 did not result in a reduction in the overall harvest rate of Unuk River king salmon (Table 1).

Option B—Combination of Shaping and Closures with modification

Specific Action in the Troll Fishery to Implement the Objective:

- **Winter Troll**: Notwithstanding any remaining seasonal guideline harvest level, the winter troll fishery will be closed by EO in all waters of Southeast Alaska/Yakutat on March 15.
- **Spring Troll**: Using EO authority, opportunities during May and June spring troll king salmon fisheries will be limited to THAs, waters in close proximity to hatchery facilities or release sites, and in areas that have been identified as having low proportional harvests of wild stock Southeast Alaska/Yakutat king salmon. Spring troll chum fisheries, as provided for in the *District 12 and District 14 Enhanced Chum Salmon Troll Fisheries Management Plan*, will begin June 15, with retention of king salmon prohibited.
- **Summer Troll**:
  - The first retention period for king salmon during the general summer troll fishery will open July 1 to target 70% of the remaining troll king salmon annual allocation, minus the number of treaty king salmon harvested in winter and spring troll fisheries.
  - The second summer retention period for king salmon, occurring in August, would open by EO to target any remaining portion of the annual troll allocation following the first retention period.

Benefits: These management measures can be accomplished through EO authority. The restrictions are directly related to historical coded-wire tag recovery data.

Detriments: Harvest opportunity for species other than king salmon may be lost due to king salmon restrictions.

ACTION #2: SPORT FISHERY

Objective: Reduce the sport harvest of Unuk River king salmon.

Background: Unuk River king salmon are harvested throughout the marine waters of SEAK, primarily in the Ketchikan area. Regionwide regulations for king salmon in the marine sport fisheries in SEAK vary annually. Bag and possession limits and other management measures are set annually as directed by the *Southeast Alaska King Salmon Management Plan* according to the preseason king salmon abundance index as determined by the Chinook Technical Committee of the Pacific Salmon Commission. In addition, the Division of Sport Fish used commissioner's EO authority to restrict time and area, reduce bag and possession limits, and close areas to sport fishing in the Ketchikan management area from 2014–2017.

Option B—Reduce Area Open to Sport Fishing for King Salmon, Restrict Bag Limits and Reduce Size of THA with modification

Expand sport fishing closures in north and northeast Behm Canal, implement non-retention in West Behm Canal, southeast Behm Canal and southern Revillagigedo Channel, implement a one fish bag limit in the remaining waters of the Ketchikan area, significantly reduce the size of the Ketchikan sportfish THA to Herring Bay only and expand limits inside Neets Bay (Figure 6).

Specific Action to Implement the Objective: Implement actions by EO or by regulation:

- **North and Northeast Behm Canal:** In Behm Canal and the contiguous bays enclosed to the north by a line from the western entrance of Bailey Bay to the northern tip of Hassler Island, and a line from Fin Point to Dress Point to a line from Cactus Point to Point Eva, January 1–December 31, closed to salmon fishing.
- **West Behm Canal:** In West Behm Canal and the contiguous bays enclosed to the north by a line from the western entrance of Bailey Bay to the northern tip of Hassler Island, and a line from Fin Point to Dress Point, and to the south by a line from Indian Point to Mike Point, April 1–August 14, no retention of king salmon.
- **Southeast Behm Canal and Southern Revillagigedo Channel:** In the waters of southern Revillagigedo Channel enclosed from a line from Lucky Point to Middy Point, continuing to the latitude of Beaver Point, and from Point Rosen to Quadra Point, and in southeast Behm Canal from Cactus Point to Eva Point, April 1–August 14, no retention of king salmon.
- **Remainder of Ketchikan Area:** In the marine waters of Ketchikan north and east from the International Boundary Line at Dixon Entrance from 54°42.48’ N. lat., 130°36.92’ W. long to 54°40’ N. lat., 131°45’ W. long, continuing north to Caamano Point and enclosed to the north by a line from Indian Point to Mike Point and to the southeast from Lucky Point to Middy Point, continuing to the latitude of Beaver Point, and from Point Rosen to Quadra Point, April 1–August 14, the bag and possession limit is one king salmon 28 in or greater in length for all anglers; nonresident annual limit of 3 king salmon or lower.
- **Herring Bay THA:** In the waters of Herring Bay west of a line from the southernmost entrance of Hole-In-The-Wall harbor to ADF&G markers located ½ mile north of Whitman Creek to the fresh/salt water boundary signs located at the mouth of Herring Cove Creek, June 1–July 31, the bag and possession limit is 6 king salmon, with no size limit or annual limit.
- **Neets Bay THA:** East of the longitude of the eastern most tip of Bug Island the bag and possession limit is one king salmon, 28 in or greater in length for all anglers; annual limit of 3 king salmon or lower.

Benefits: These management actions can be accomplished through EO authority and allow the department to retain the ability to return to more liberal fisheries if king salmon runs rebuild prior to the next board meeting (Appendix B). This option will reduce harvest of king salmon returning to the Ketchikan area while providing harvest opportunity for sport anglers to target hatchery kings returning to Whitman Lake Hatchery, Neets Bay Hatchery, Deer Mountain Hatchery and the Carroll Inlet remote release site.

Detriments: The harvest of Unuk River king salmon may still occur. More restrictive options reduce levels of sport fishing opportunity and have economic impacts on the charter fleet.

ACTION #3: PERSONAL USE FISHERY

Objective: Reduce the personal use harvest of Unuk River king salmon.

Background: The Unuk River lies in the Ketchikan Non-Subsistence Area and there is no record of king salmon harvested incidentally there during permitted personal use fishing. The only personal use fishery in Behm Canal with reported bycatch of king salmon takes place in Yes Bay and between 2 and 11 king salmon have been harvested there since 2005.

Option A—Specific Action to Implement the Objective:

- Using EO authority, prohibit the retention of king salmon in the Yes Bay and Unuk River personal use fisheries.

Benefits: Ensure that no king salmon are harvested as incidental catch.

Detriments: This action is not likely to result in increased escapement of Unuk River king salmon because the personal use harvest is already very low.

CONDITIONS FOR REDUCING MANAGEMENT RESTRICTIONS OR DELISTING STOCK OF CONCERN

Criteria for removing the stock of concern designation or reducing management restrictions include:

1. If the lower bound of the biological escapement goal range is met or exceeded in 3 consecutive years or is met in 4 out of 6 consecutive years, the department will recommend removing Unuk River king salmon as a stock of management concern at the first Southeast and Yakutat board meeting after this condition is met.
2. Management measures could be relaxed in specific areas if updated stock composition and harvest data indicates areas where restrictions are no longer needed to ensure the escapement goal is met.
3. In the event that two consecutive years of escapements are near the upper bound of the escapement goal range or above the range, some management restrictions may be relaxed or set aside using EO authority.

Stock status, action plan performance (including information on harvest rate, distribution, and timing in commercial fisheries), and escapement goal review will be updated in a report to the board at the 2021 Southeast and Yakutat meeting.

RESEARCH PLAN

Past and Current Research Projects for the Unuk River

The department has conducted extensive research and monitoring projects on the Unuk River related to king salmon, beginning with coded-wire-tagging efforts implemented in 1982. These efforts continued through 1986, and then again from 1992 to present. The Unuk River king salmon stock is an escapement and exploitation rate indicator stock recognized by the Pacific Salmon Commission and the Chinook Technical Committee. Pacific Salmon Treaty obligations include producing the full suite of stock assessment data: smolt production, overwinter and marine survival, harvest (calendar year) and exploitation (brood year) rates, and estimates of escapement as well as the age-sex-length composition of those escapements. The following

research programs have been and are being conducted to gather detailed information about Unuk River king salmon stocks:

1. The Unuk River stock is part of the coastwide king salmon genetic baseline (Gilk-Baumer et al. 2017); however, identifying wild Unuk River king salmon is convoluted because these fish are used as brood stock for hatchery releases in SEAK.
2. Standardized aerial and foot escapement surveys since the 1970s (Richards and Frost 2017).
3. Mark–recapture studies (Johnson 2013).
4. Age, sex, and length composition, coded wire tag and escapement sampling (Richards and Frost 2017).
5. Marine harvest sampling of the commercial and sport fisheries is conducted by the department annually throughout SEAK and these programs include varying study designs to estimate biological parameters associated with age, sex, length, fishing effort, and catch, harvest and coded wire tag sampling (Jaenicke et al. 2015 and 2017; Buettner et al. 2017).

ACKNOWLEDGEMENTS

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REFERENCES CITED

Buettner, A. R., A. M. Reynolds, and J. R. Rice. 2017. Operational Plan: Southeast Alaska and Yakutat salmon commercial port sampling 2016–2019. Alaska Department of Fish and Game, Regional Operational Plan ROP.CF.1J.2017.01, Douglas.

Der Hovanisian, J., S. McPherson, E. Jones, P. Richards, R. Chapell, B. Elliott, T. Johnson, and S. Fleischman. 2011. Chinook salmon status and escapement goals for stocks in Southeast Alaska. Alaska Department of Fish and Game, Special Publication No. 11-19, Anchorage.

Fried, S. M. 1994. Pacific salmon spawning escapement goals for Prince William Sound, Cook Inlet, and Bristol Bay areas of Alaska. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Special Publication No. 8, Juneau.

Gilk-Baumer, S., W. D. Templin, D.F. Evenson, and E. L. Jones. 2017. Mixed stock analysis of Chinook salmon harvested in the Southeast Alaska sport fishery, 2004–2015. Alaska Department of Fish and Game, Fishery Data Series No. 17-43, Anchorage.

Heinl, S. C., E. L. Jones III, A. W. Piston, P. J. Richards, and L. D. Shaul. 2014. Review of salmon escapement goals in Southeast Alaska, 2014. Alaska Department of Fish and Game, Fishery Manuscript Series No. 14-07, Anchorage.

Heinl, S. C., E. L. Jones III, A. W. Piston, P. J. Richards, L. D. Shaul, B. W. Elliott, S. E. Miller, R. E. Brenner, and J. V. Nichols. 2017. Review of salmon escapement goals in Southeast Alaska, 2017. Alaska Department of Fish and Game, Fishery Manuscript Series No. 17-11, Anchorage.

Hendrich, C. F., J. L. Weller, S. A. McPherson, and D. R. Bernard. 2008. Optimal production of Chinook salmon from the Unuk River. Alaska Department of Fish and Game, Fishery Manuscript No. 08-03, Anchorage.

Jaenicke, M. J., D. Tersteeg, and S. J. H. Power. 2015. Southeast Alaska marine boat sport fishery harvest studies, 2015–2016. Alaska Department of Fish and Game, Regional Operational Plan SF.1J.2015.06, Anchorage.

Jaenicke, M., D. Tersteeg, and S. J. H. Power. 2017. Operational Plan Amendment: Southeast Alaska marine boat sport fishery harvest studies, 2015–2017. Alaska Department of Fish and Game, Regional Operational Plan SF.1J.2017.02, Anchorage.

Johnson, T. A. 2013. A mark–recapture experiment to estimate the escapement of Chinook salmon in the Unuk River, 2013. Alaska Department of Fish and Game, Regional Operational Plan No. SF.1J.2013.09, Anchorage.

McPherson, S. A., and J. Carlile. 1997. Spawner-recruit analysis of Behm Canal Chinook salmon stocks. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report IJ97-06, Juneau.

Nichols, J., K. Schroder, B. Frenette, J. Williams, A. Crupi, and K. Smikrud. 2013. A user guide for performing stream habitat surveys in Southeast Alaska. Alaska Department of Fish and Game, Special Publication No. 13-04, Anchorage

Richards, P., and N. Frost. 2017. Production and harvest of Unuk River Chinook salmon, 2017–2018. Alaska Department of Fish and Game, Regional Operational Plan No. ROP.SF.1J.2017.05, Anchorage.

TABLES

Table 1.–Unuk River large king salmon escapement and harvest rate estimates of ≥age-1.2 fish, 2007–2016.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	5-year Average	10-year Average
Escapement[a]	5,668	3,104	3,157	3,835	3,195	956	1,135	1,691	2,623	1,463	1,574	2,683
Harvest	2,293	809	1,133	1,577	1,491	2,354	1,436	1,343	3,384	1,359	1,975	1,718
Total Run	7,961	3,913	4,290	5,412	4,686	3,310	2,571	3,034	6,007	2,822	3,549	4,401
Harvest Rate:												
Troll Winter	0.02	0.04	0.02	0.10	0.03	0.35	0.01	0.04	0.02	0.07	0.10	0.07
Troll Spring	0.08	0.06	0.11	0.08	0.17	0.11	0.19	0.19	0.21	0.14	0.17	0.13
Troll Summer R1[b]	0.08	0.03	0.05	0.03	0.01	0.03	0.01	0.04	0.06	0.02	0.03	0.04
Troll Summer R2[b]	0.02	0.0	0.01	0.0	0.01	0.01	0.15	0.0	0.04	0.0	0.04	0.02
Troll All	0.20	0.14	0.19	0.21	0.22	0.50	0.36	0.28	0.32	0.23	0.34	0.26
Sport Early[c]	0.03	0.01	0.06	0.06	0.04	0.08	0.05	0.03	0.01	0.06	0.05	0.04
Sport Late[c]	0.01	0.0	0.0	0.01	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Sport All	0.04	0.01	0.06	0.07	0.06	0.08	0.05	0.03	0.01	0.06	0.05	0.05
Net All	0.03	0.05	0.02	0.01	0.03	0.14	0.15	0.13	0.23	0.19	0.17	0.10
U.S. All	0.28	0.21	0.26	0.29	0.31	0.71	0.56	0.44	0.56	0.48	0.55	0.41
Canada All	0.01	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Total	0.29	0.21	0.26	0.29	0.32	0.71	0.56	0.44	0.56	0.48	0.55	0.41

Note: Gray cells indicate the escapement for a given year was below the lower bound of the BEG.

[a] The BEG range for the Unuk River is 1,800 to 3,800 large adult king salmon. Gray cells in this row indicate escapements below the lower bound of the BEG for that particular year.

[b] Troll Summer R1 occurs in July of the current year; Troll Summer R2 occurs from August through September of the prior year.

[c] Sport Early occurs April through July of the current year; Sport Late occurs in August of the prior year.

Table 2.–Southeast Alaska aggregate abundance-based management (AABM) preseason abundance indices (AI) and allowable catches (AC) for commercial and sport fisheries, 2012–2017.

Year	Preseason AI	Net	Troll	Sport	Total AC
2012	1.52	20,210	197,272	49,318	266,800
2013	1.20	13,672	129,862	32,466	176,000
2014	2.57	32,637	325,411	81,353	439,400
2015	1.45	18,064	175,149	43,787	237,000
2016	2.06	26,603	263,197	65,799	355,600
2017	1.27	16,098	154,881	38,720	209,700

FIGURES

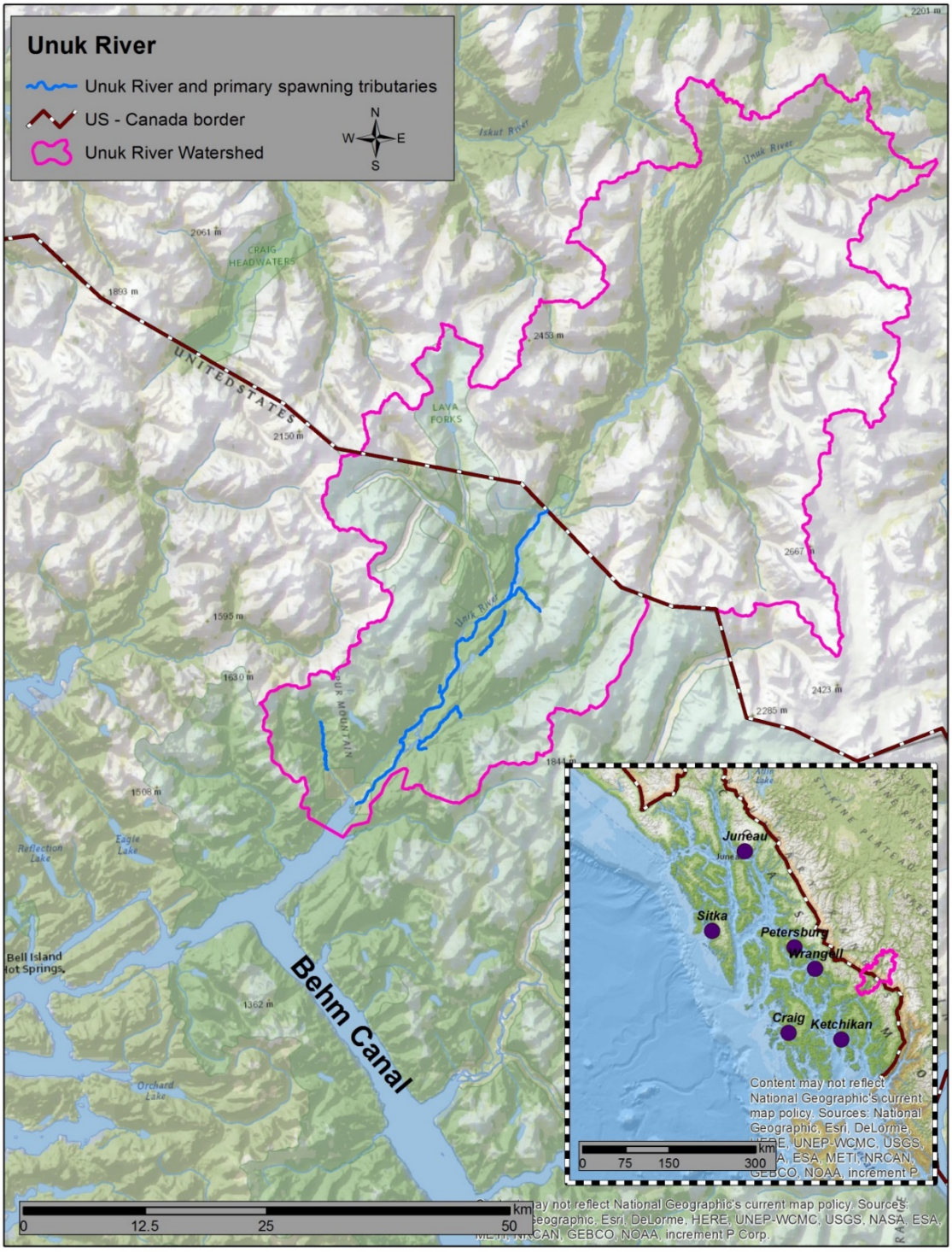


Figure 1.–Map of the Unuk River watershed and primary king salmon spawning tributaries in the Alaska portion of the watershed.

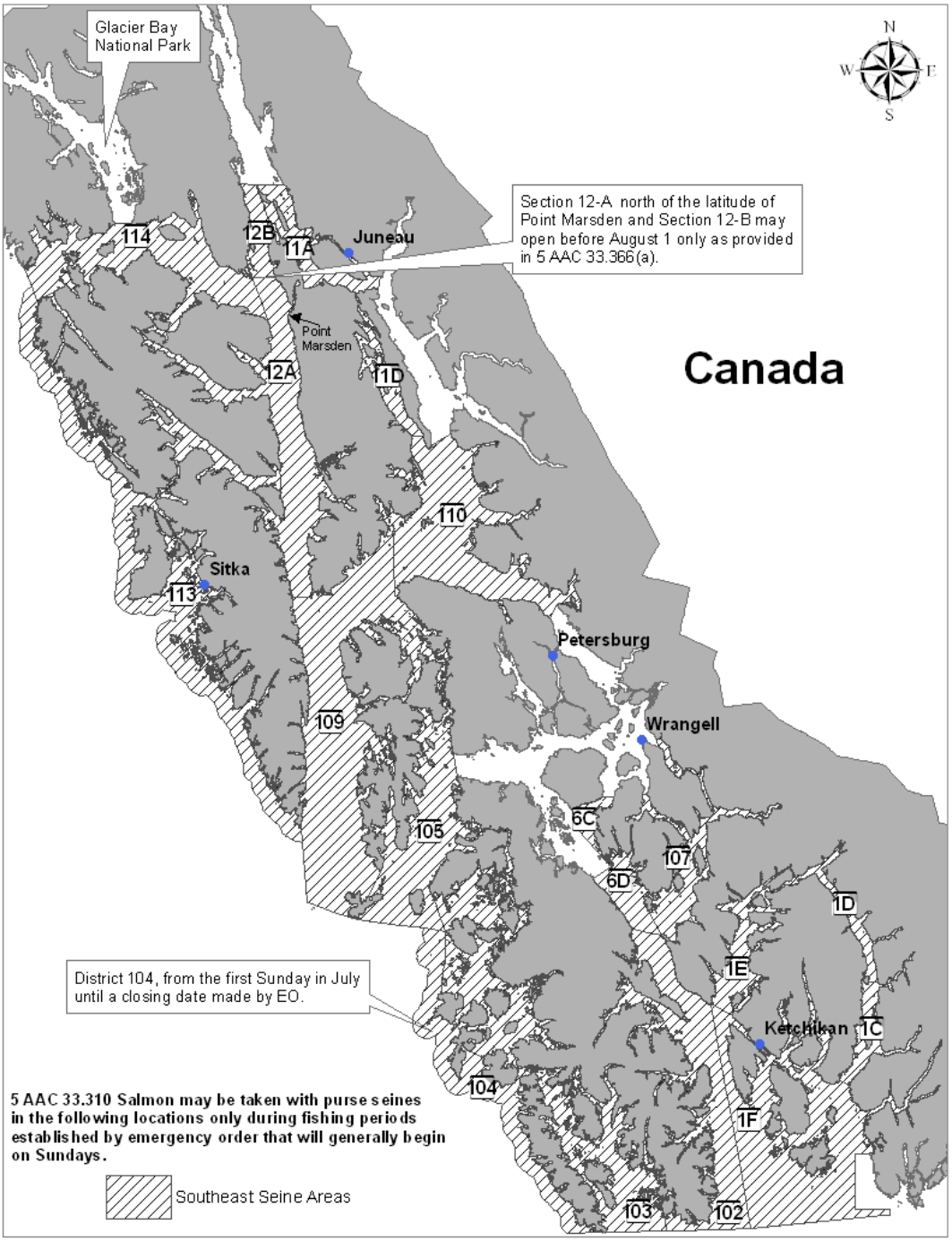


Figure 2.–Map of Southeast Alaska purse seine fishing areas.

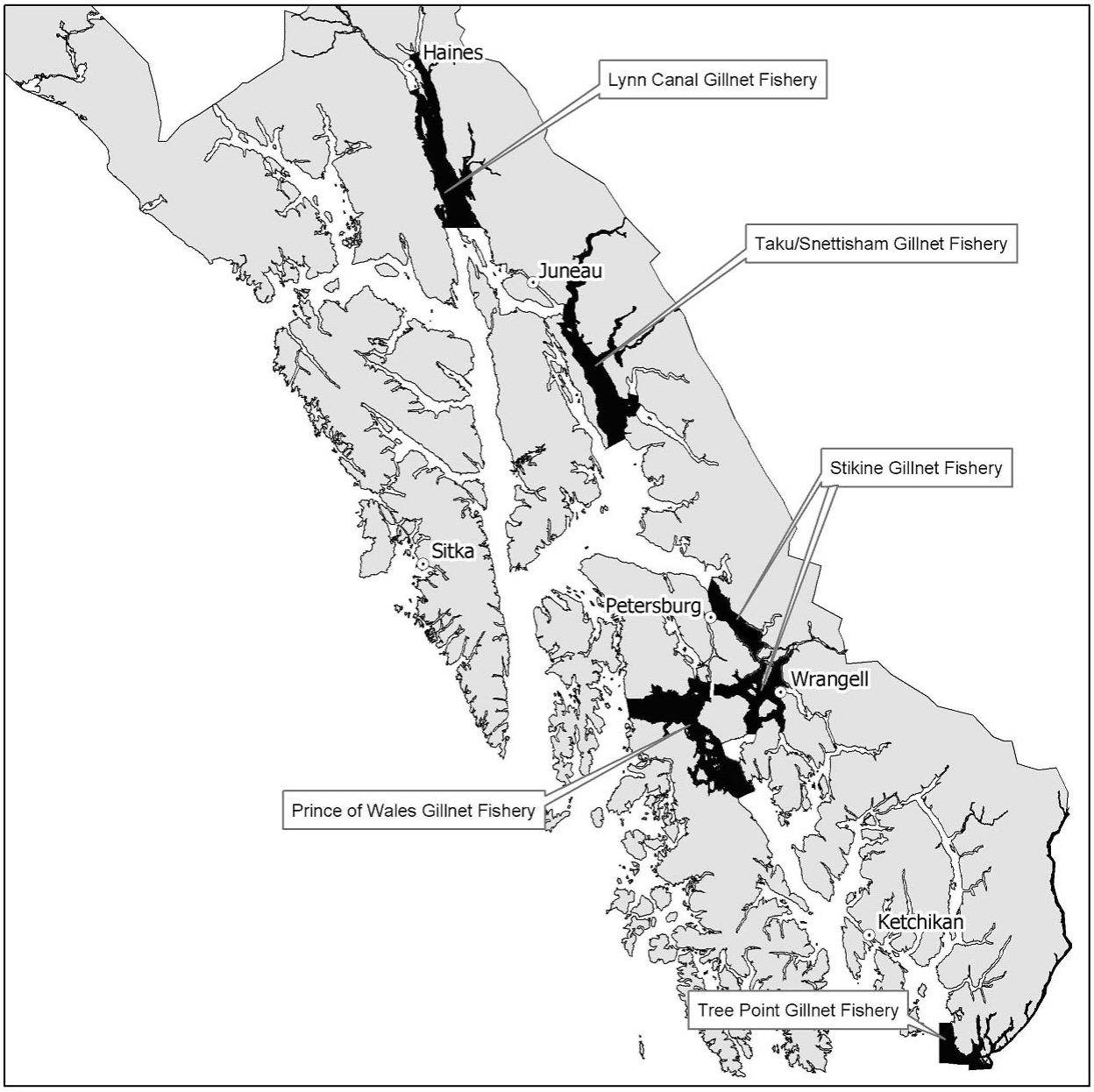


Figure 3.–Map of traditional drift gillnet fishing areas in Southeast Alaska.

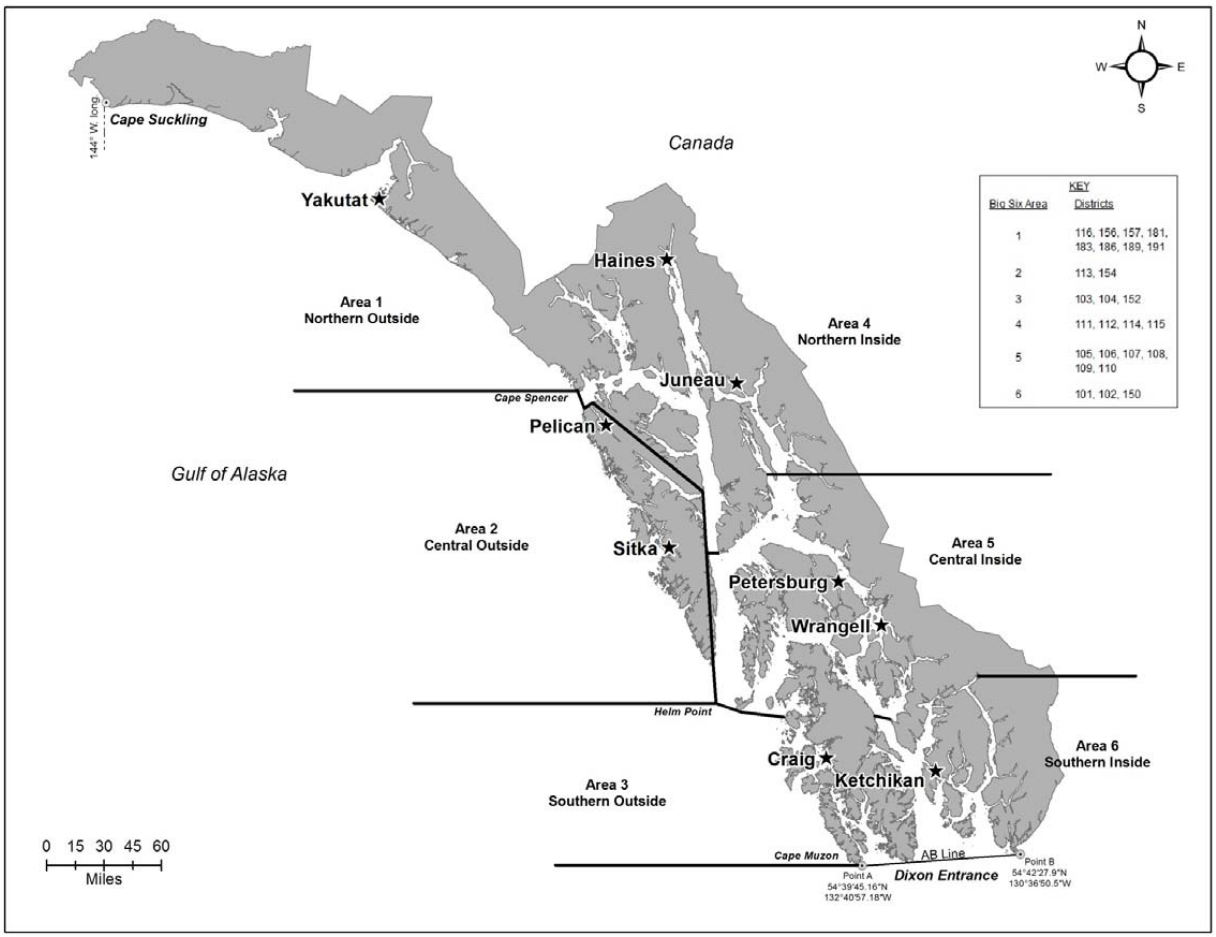


Figure 4.–Map of Southeast Alaska commercial troll fishing and Big Six management areas, Cape Suckling to Dixon Entrance.

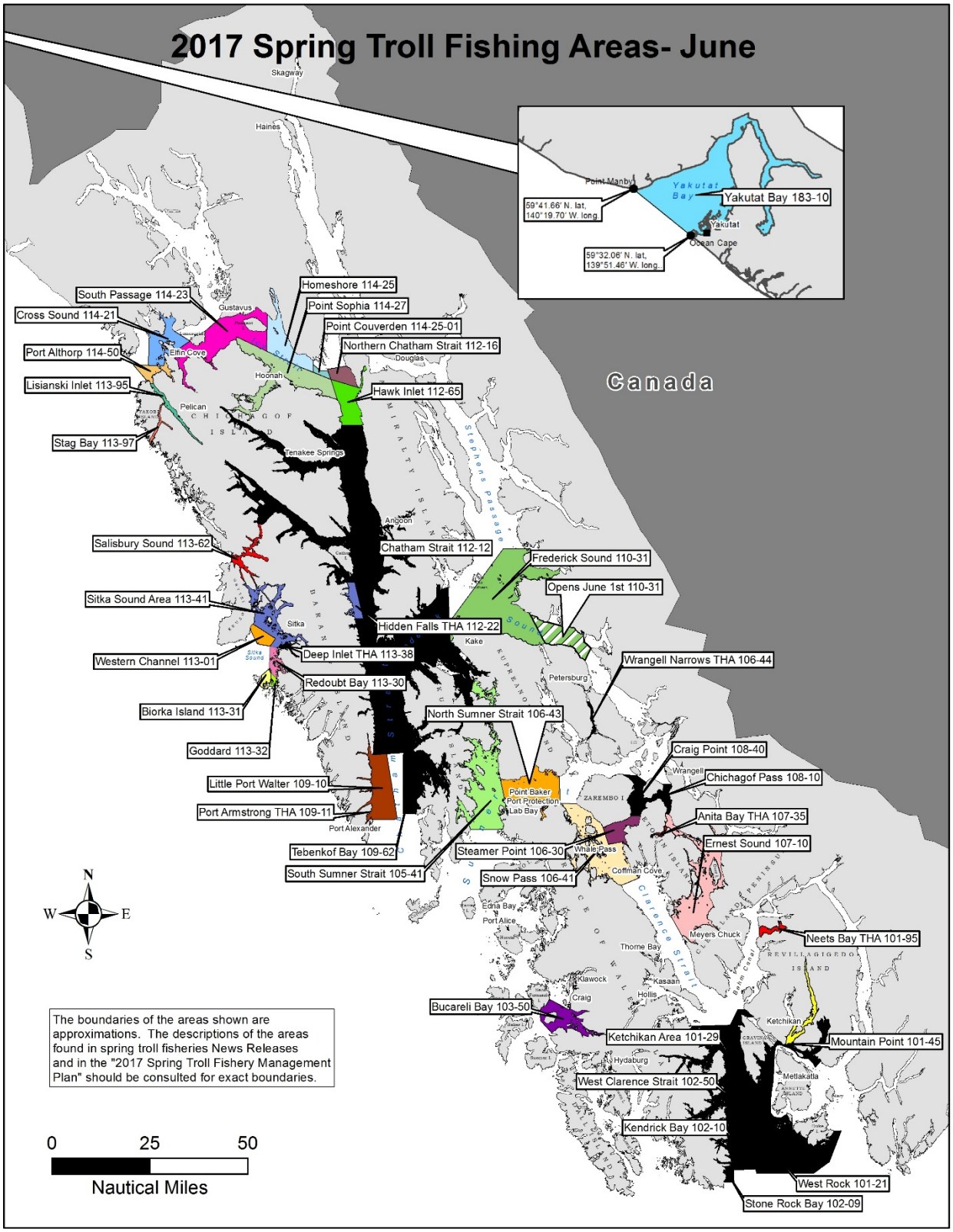


Figure 5.–Map of spring commercial troll fishing areas in Southeast Alaska.

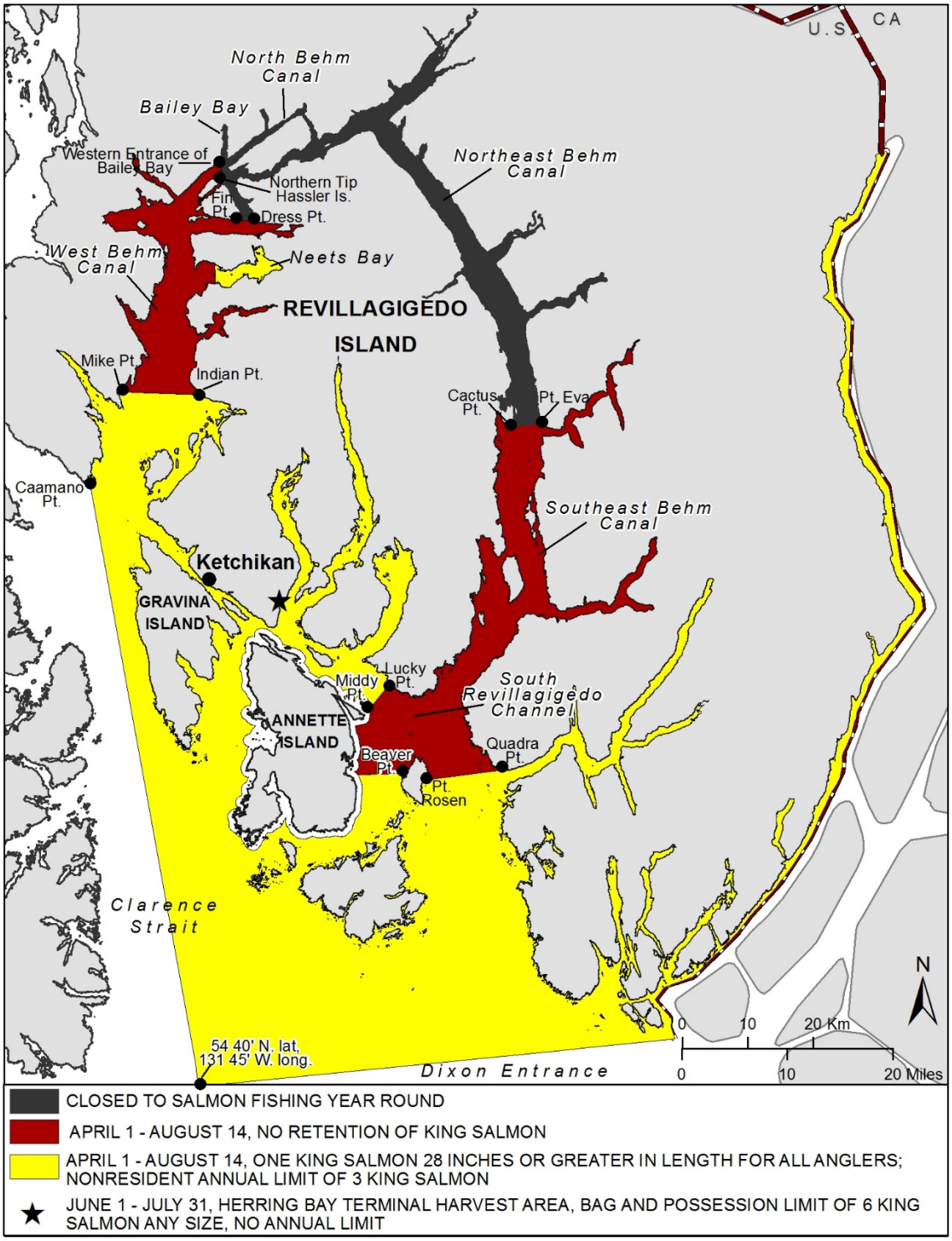


Figure 6.–Map depicting sport fishery management measures to implement Unuk River king salmon action plan Option B with modification.

APPENDICES

Appendix A1.–Options to reduce harvest of Unuk River king salmon in the commercial fisheries. Presented to the board and public for consideration at the January 2018 Southeast and Yakutat regulatory meeting.

ACTION #1–COMMERCIAL FISHERY

Objective: Reduce the commercial harvest of Unuk River king salmon.

Background: The approach taken by the department to date has been to shape the spring troll fishery in a manner that reduces time and area in the immediate vicinity of the Unuk River and other spring troll areas where coded-wire tag recoveries of Unuk River king salmon have occurred. In addition to area specific management measures during spring, a closure of all Southeast Alaska/Yakutat spring troll fisheries was implemented from May 29 through June 14, 2017, and king salmon retention in all troll fisheries closed for the season on August 10, 2017 and no second summer troll king retention period was opened. Measures taken in the purse seine and gillnet fisheries have been limited to time and area restrictions in the Neets Bay THA based on Unuk River king salmon tag recoveries and regional non-retention of king salmon over 28 in in length in the purse seine fishery.

Option A. Status Quo.

Specific Action to Implement the Objective:

1. *Net Gear*:
   - Close Neets Bay THA for 6 days in SWs 24–27.
   - Regional non-retention of king salmon over 28 inches in length for purse seine fisheries.
2. *Spring Troll:*
   - Continued closure of West Behm Canal, Point Alava, Clarence Strait, and a portion of former Ketchikan (Gravina Island) area for duration of spring.
   - Kendrick Bay reduced opening lengths to maximum of 3 days/week through SW 21.
   - Stone Rock Bay reduced to 1 day/week through SW 21.
   - Mountain Point reduced to 4 days/week for SWs 18–21, and reduced area open beginning June 15.
   - Ketchikan Area reduced to 3 days/week in SWs 18–21.
   - With exception of Mountain Point, all spring fisheries located in Districts 1 and 2 closed during SWs 22–26 (May 29–June 30).

Benefits: These management actions can be accomplished through EO authority and the user groups are accustomed to the actions. The restrictions are directly related to historical coded-wire tag data. The fisheries impacted by these restrictions experience minimal disruption.

Detriments: Since 2014 for troll and 2015 for the net gear when these management actions were implemented, the Unuk River king salmon escapement goal has only been met in 2015. In the remaining 3 years, under a progressively more conservative management regime harvest rates remained near or above the 10-year average, and king salmon escapements have fallen below the escapement goal range.

Option B. Combination of Shaping and Closures.

Specific Action to Implement the Objective:

1. *Net Gear*:
    - Close Neets Bay THA for 6–8 days in SWs 24–27. THA not expanded (per regulation) until July 1.
    - Regional non-retention of king salmon over 28 inches in length for purse seine fisheries.
2. *Winter Troll*:
    - Notwithstanding any remaining seasonal guideline harvest level, the winter troll fishery will close in all waters of Southeast Alaska/Yakutat on March 15.
3. *Spring Troll*:
    - Opportunities during May and June spring troll king salmon fisheries will be limited to THAs, waters in close proximity to hatchery facilities or release sites, and in areas that have been identified as having low proportional harvests of wild stock Southeast Alaska/Yakutat king salmon. Spring troll chum fisheries, as provided for in the *District 12 and District 14 Enhanced Chum Salmon Troll Fisheries Management Plan,* will begin June 15, with retention of king salmon prohibited.
4. *Summer Troll*:
    - The first retention period for king salmon during the general summer troll fishery will be delayed by a week and will open to target 70% of the remaining troll king salmon annual allocation, minus the number of treaty king salmon harvested in winter and spring troll fisheries, on July 8.

Benefits: These management actions can be accomplished through EO authority. The restrictions are directly related to historical coded-wire tag data.

Detriments: Harvest opportunity for species other than king salmon may be lost due to king salmon restrictions.

Option C. Wide Scale Troll and THA Closures.

Specific Action to Implement the Objective:

1. *Net Gear*:
    - Modify the Neets Bay THA management plan to allow very limited net openings at the end of June. The area open for net fisheries would be limited to the inner portion of the waters of Neets Bay east of Clam Island. Cost recovery would be delayed until July 1 and open in the waters of Neets Bay east of Clam Island.
    - Regional non-retention of king salmon over 28 inches in length for purse seine fisheries.
2. *Winter Troll*:
    - Notwithstanding any remaining seasonal guideline harvest level, the winter troll fishery will close in all waters of Southeast Alaska/Yakutat on March 15.
3. Spring Troll:
    - Close spring troll season.
4. Summer Troll:
    - Delay summer troll season until July 15.

Benefits: These management actions can be accomplished through EO authority. The restrictions are directly related to historical coded-wire tag data.

Detriments: Harvest opportunity for species other than king salmon may be lost due to king salmon restrictions. Excess fish returning to the Neets Bay hatchery could cause operational problems. Closures in the THA could create foregone harvest opportunity with both terminal fisheries and hatchery cost recovery. Delayed harvest of returning hatchery fish could also cause economic loss due to the loss of fish quality.

Appendix A2.–Options to reduce harvest of Unuk River king salmon in the sport fishery. Presented to the board and public for consideration at the January 2018 Southeast and Yakutat regulatory meeting.

The benefits and detriments described below are intended to reflect only those related to the goal of rebuilding king salmon to levels that achieve the current BEG range for Unuk River.

ACTION #2–SPORT FISHERY

Objective: Reduce the sport harvest of Unuk River king salmon.

Background: Unuk River king salmon are harvested throughout the marine waters of SEAK, primarily in the Ketchikan area. Regionwide regulations for king salmon in the marine sport fisheries in SEAK vary annually. Bag and possession limits and other management measures are set annually as directed by the *Southeast Alaska King Salmon Management Plan* according to the preseason king salmon abundance index as determined by the Chinook Technical Committee of the Pacific Salmon Commission.

The Division of Sport Fish used commissioner's EO authority to restrict time and area, reduce bag and possession limits and close areas to sport fishing in the Ketchikan management area from 2014–2017.

Option A. Status Quo.

Continue to use department EO authority to implement conservative king salmon regulations in the Ketchikan area identical to those implemented in 2017 (Appendix A3).

Specific Action to Implement the Objective: Use EO authority to restrict the king salmon sport fishery preseason by implementing closures and reduce limits in the Ketchikan area as follows:

North Behm Canal: Closed to salmon fishing from April 1 to August 14 in Behm Canal and the contiguous bays enclosed to the north by a line from Point Lees to Elsie Point and a line from Elsie Point to the longitude of the outlet of Long Lake, and to the south by a line from the western entrance of Bailey Bay to the northern tip of Hassler Island, and a line from Fin Point to Dress Point (Appendix A3).

West Behm Canal: From April 1 to August 14, the bag and possession limit is one king salmon 28 in or greater in length for all anglers; nonresident annual limit of 3 king salmon 28 in or greater in length in the waters of West Behm Canal enclosed to the north by a line from the western entrance of Bailey Bay to the northern tip of Hassler Island and a line from Fin Point to Dress Point, and to the south by a line from Niblack Point to South Vallenar Point, and Tongass Narrows north of the latitude of Lewis Reef light (Appendix A3).

Southeast Behm Canal: Salmon fishing is closed from April 1 through August 14 in southeast Behm Canal and the contiguous bays between a line from Point Eva to Cactus Point and a line from the latitude of Point Nelson (Appendix A3).

Herring Bay THA: Postpone liberal king salmon regulations in a majority of the THA until July 1 by implementing king salmon regulations of a one fish bag and possession limit for all anglers and a nonresident annual limit of 3 fish April 1 through June 30. On July 1, king salmon regulations revert to the Herring Bay THA king salmon regulations of 6 fish any size with no annual limit. In Herring Bay west of a line from the southernmost entrance of the Hole-In-The-Wall harbor to ADF&G markers located ½ mile north of Whitman Creek, to the fresh/salt water

boundary signs located at the mouth of Herring Cove Creek, the Herring Bay THA king salmon regulations apply June 1 through July 31.

Remainder of Ketchikan area: Regional king salmon regulations set under the Southeast Alaska King Salmon Management Plan apply.

Benefits: These management actions can be accomplished through emergency order authority and allow the department to retain the ability to return to more liberal fisheries if king salmon runs rebuild prior to the next board meeting. The proposed closure dates and areas are specific to the majority of Unuk River stocks migration through these areas and allow sport fish opportunity outside those dates.

Detriments: The harvest of king salmon would still occur and may not be lower than historical harvest rate ranges. More restrictive options reduce levels of sport fishing opportunity and have economic impacts on the charter fleet.

Option B. Reduce Area Open to Sport Fishing for King Salmon, Restrict Bag Limits and Reduce Size of THA.

Expand sport fishing closures in north and northeast Behm Canal, implement non-retention in West Behm Canal, southeast Behm Canal and southern Revillagigedo Channel, implement a one fish bag limit in the remaining waters of the Ketchikan area, significantly reduce the size of the Ketchikan sportfish THA to Herring Bay only and expand limits inside Neets Bay (Appendix A4).

Specific Action to Implement the Objective: Implement actions by EO or by regulation:

North and Northeast Behm Canal: Closed to salmon fishing year-round in Behm Canal and the contiguous bays enclosed to the north by a line from the western entrance of Bailey Bay to the northern tip of Hassler Island, and a line from Fin Point to Dress Point to a line from Cactus Point to Point Eva (Appendix A4).

West Behm Canal: Closed to king salmon retention from April 1 through August 14 in West Behm Canal and the contiguous bays enclosed to the north by a line from the western entrance of Bailey Bay to the northern tip of Hassler Island, and a line from Fin Point to Dress Point, and to the south by a line from Indian Point to Mike Point (Appendix A4).

Southeast Behm Canal and Southern Revillagigedo Channel: Closed to king salmon retention from April 1 through August 14, in the waters of southern Revillagigedo Channel enclosed from a line from Lucky Point to Middy Point, continuing to the latitude of Beaver Point, and from Point Rosen to Quadra Point, and in southeast Behm Canal from Cactus Point to Eva Point (Appendix A4).

Remainder of Ketchikan: From April 1 through August 14 the bag and possession limit is one king salmon 28 in or greater in length for all anglers; annual limit of 3 king salmon in the marine waters of Ketchikan north and east from the International Boundary Line at Dixon Entrance from 54°42.48’ N. lat., 130°36.92’ W. long to 54°40’ N. lat., 131°45’ W. long, continuing north to Niblack Point and enclosed to the north by a line from Indian Point to Mike Point and to the southeast from Lucky Point to Middy Point, continuing to the latitude of Beaver Point, and from Point Rosen to Quadra Point (Appendix A4).

Herring Bay THA: In the waters of Herring Bay west of a line from the southernmost entrance of Hole-In-The-Wall harbor to ADF&G markers located ½ mile north of Whitman Creek to the

fresh/salt water boundary signs located at the mouth of Herring Cove Creek, June 1 through July 31, the bag and possession limit is 6 king salmon, with no size limit and no annual limit (Appendix A4).

Neets Bay: East of the longitude of the eastern most tip of Bug Island the bag and possession limit is one king salmon 28 in or greater in length for all anglers; annual limit of 3 king salmon (Appendix A4).

Benefits: These management actions can be accomplished through emergency order authority and allow the department to retain the ability to return to more liberal fisheries if king salmon runs rebuild prior to the next board meeting. This option will reduce harvest of king salmon returning to the Ketchikan area to a lower level than in Option A while providing harvest opportunity for sport anglers to target hatchery kings returning to Whitman Lake Hatchery, Neets Bay Hatchery, Deer Mountain Hatchery and the Carroll Inlet remote release site.

Detriments: The harvest of king salmon may still occur. More restrictive options reduce levels of sport fishing opportunity and have economic impacts on the charter fleet.

Option C. Expand Area Closed to Salmon Fishing, Further Reduce Area Open to Sport Fishing for King Salmon, Restrict Bag Limits and Reduce Size of THA.

Expand sport fishing closures in north and northeast Behm Canal and expand to include Southeast Behm Canal, implement non-retention in all of west Behm Canal, and southern Revillagigedo Channel, implement a one fish bag limit in the remaining waters of the Ketchikan area, significantly reduce the size of the Ketchikan sportfish THA to Herring Bay only and expand limits inside Neets Bay (Appendix A5).

Specific Action to Implement the Objective: Implement actions by EO or by regulation:

North, Northeast and Southeast Behm Canal: Closed to salmon fishing year-round in Behm Canal and the contiguous bays enclosed to the north by a line from the western entrance of Bailey Bay to the northern tip of Hassler Island, and a line from Fin Point to Dress Point to a line from Point Alava to Point Sykes (Appendix A5).

West Behm Canal and South Revilla Channel: Closed to king salmon retention from April 1 through August 14, in West Behm Canal enclosed to the north by a line from the western entrance of Bailey Bay to the northern tip of Hassler Island, and a line from Fin Point to Dress Point, and to the south by a line from Survey Point to Caamano Point and in South Revillagigedo Channel and the contiguous bays enclosed by a line from Carroll Point to Reef Point and continuing southeast to the latitude of Beaver Point, and from Point Rosen to Quadra Point and at the mouth of southeast Behm Canal from Point Alava to Point Sykes (Appendix A5).

Remainder of Ketchikan: From April 1 through August 14, the bag and possession limit is one king salmon 28 in or greater in length for all anglers; annual limit of 3 king in the marine waters of Ketchikan north and east from the International Boundary Line at Dixon Entrance from 54°42.48’ N. lat., 130°36.92’ W. long to 54°40’ N. lat., 131°45’ W. long, continuing north to Niblack Point, and enclosed to the northeast by a line from Caamano Point to Survey Point and to the southeast from Carroll Point to Reef Point, and from the south at the latitude of Beaver Point, and from Point Rosen to Quadra Point (Appendix A5).

Herring Bay THA: In the waters of Herring Bay west of a line from the southernmost entrance of Hole-In-The-Wall harbor to ADF&G markers located ½ mile north of Whitman Creek, to the

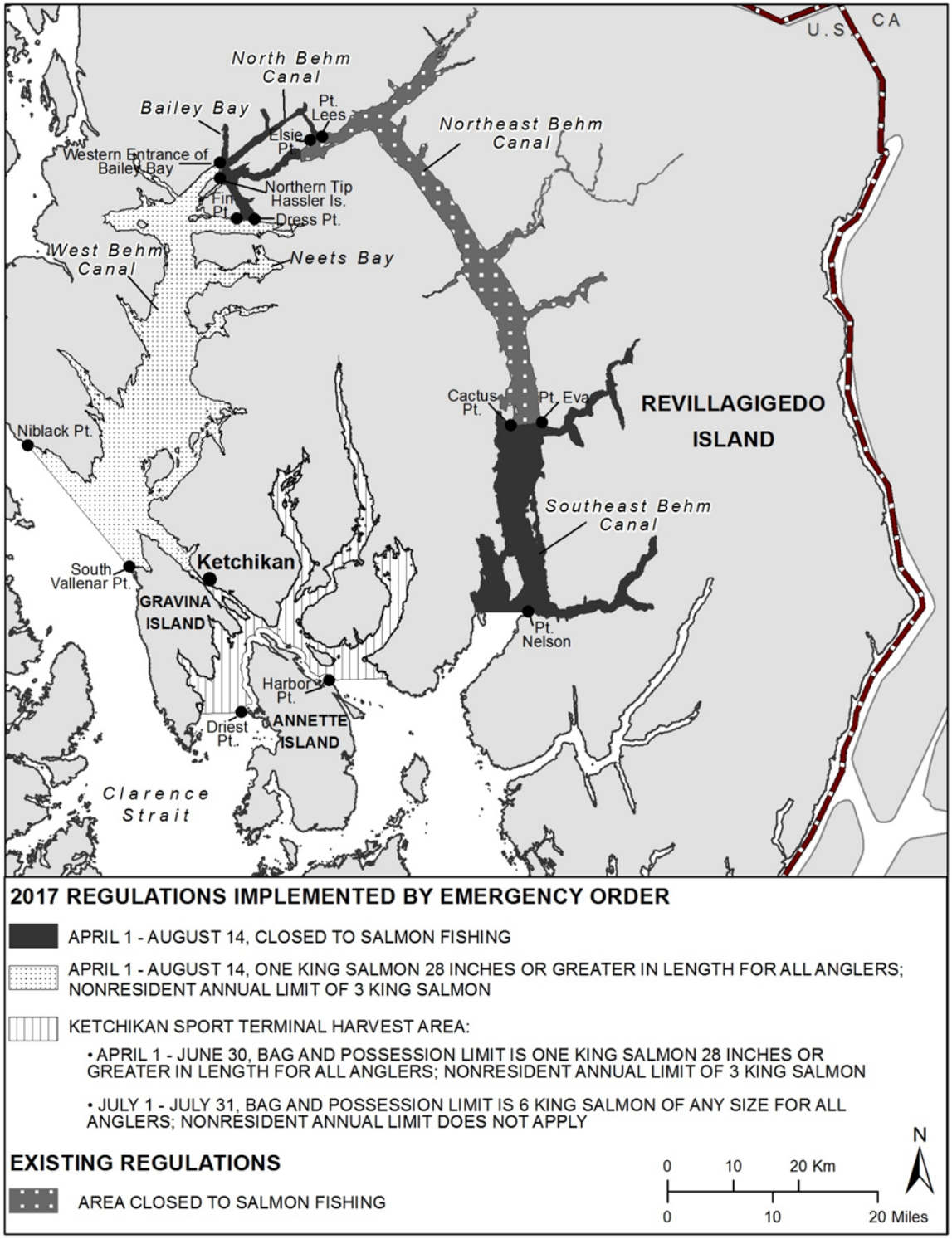
fresh/salt water boundary signs located at the mouth of Herring Cove Creek, June 1 through July 31, the bag and possession limit is 6 king salmon, with no size limit and no annual limit (Appendix A5).

Neets Bay: From April 1 through August 14, East of the longitude of the eastern most tip of Bug Island the bag and possession limit is one king salmon 28 in or greater in length for all anglers; annual limit of 3 king salmon (Appendix A5).

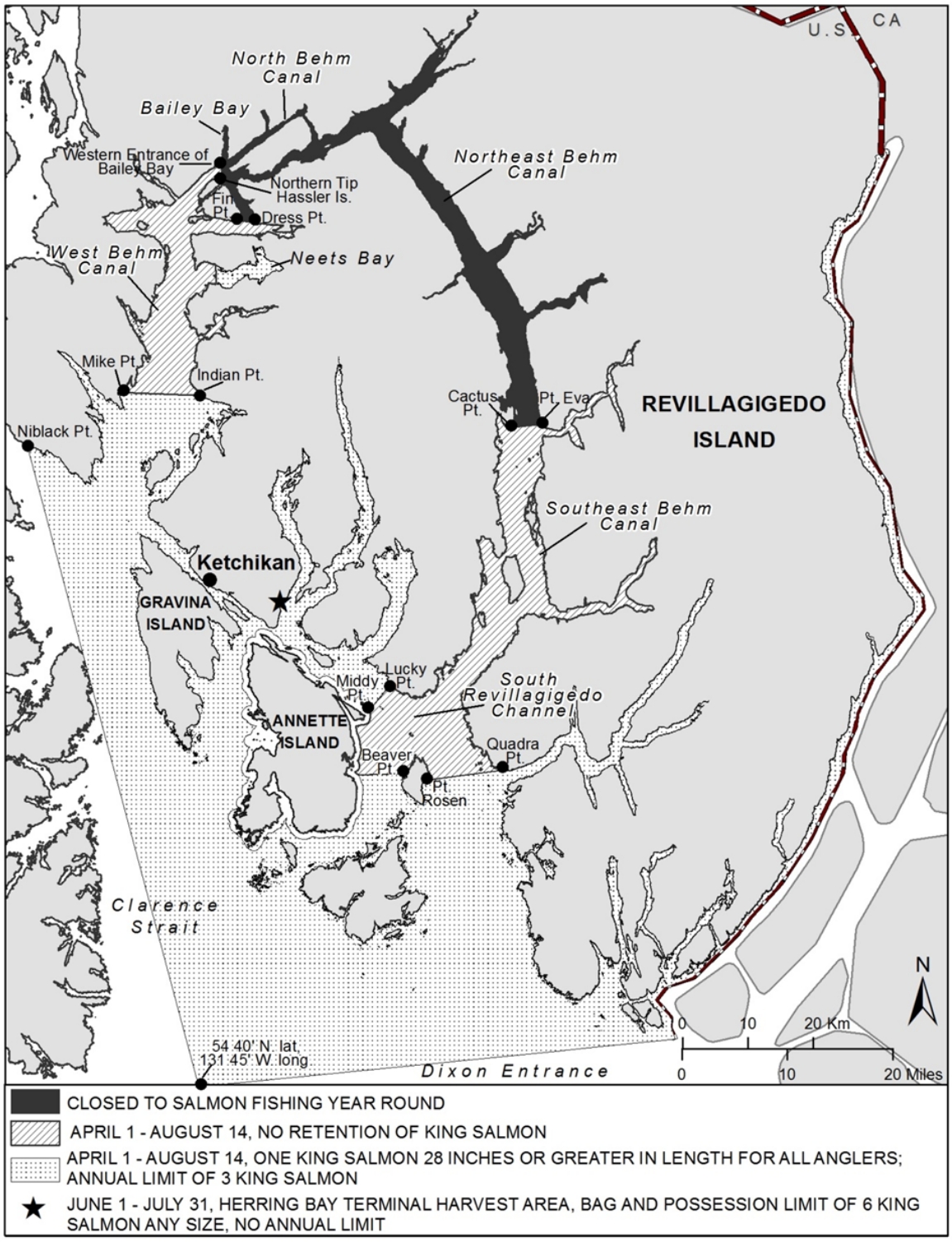
Benefits: These management actions can be accomplished through emergency order authority and allow the department to retain the ability to return to more liberal fisheries if king salmon runs rebuild prior to the next board meeting. This option will reduce harvest of king salmon returning to the Ketchikan area to a lower level than in Option A and B, while providing harvest opportunity for sport anglers to target hatchery king salmon returning to Whitman Lake Hatchery, Neets Bay Hatchery, Deer Mountain Hatchery and the Carroll Inlet remote release site.

Detriments: The harvest of king salmon may still occur. More restrictive options reduce levels of sport fishing opportunity and have economic impacts on the charter fleet.

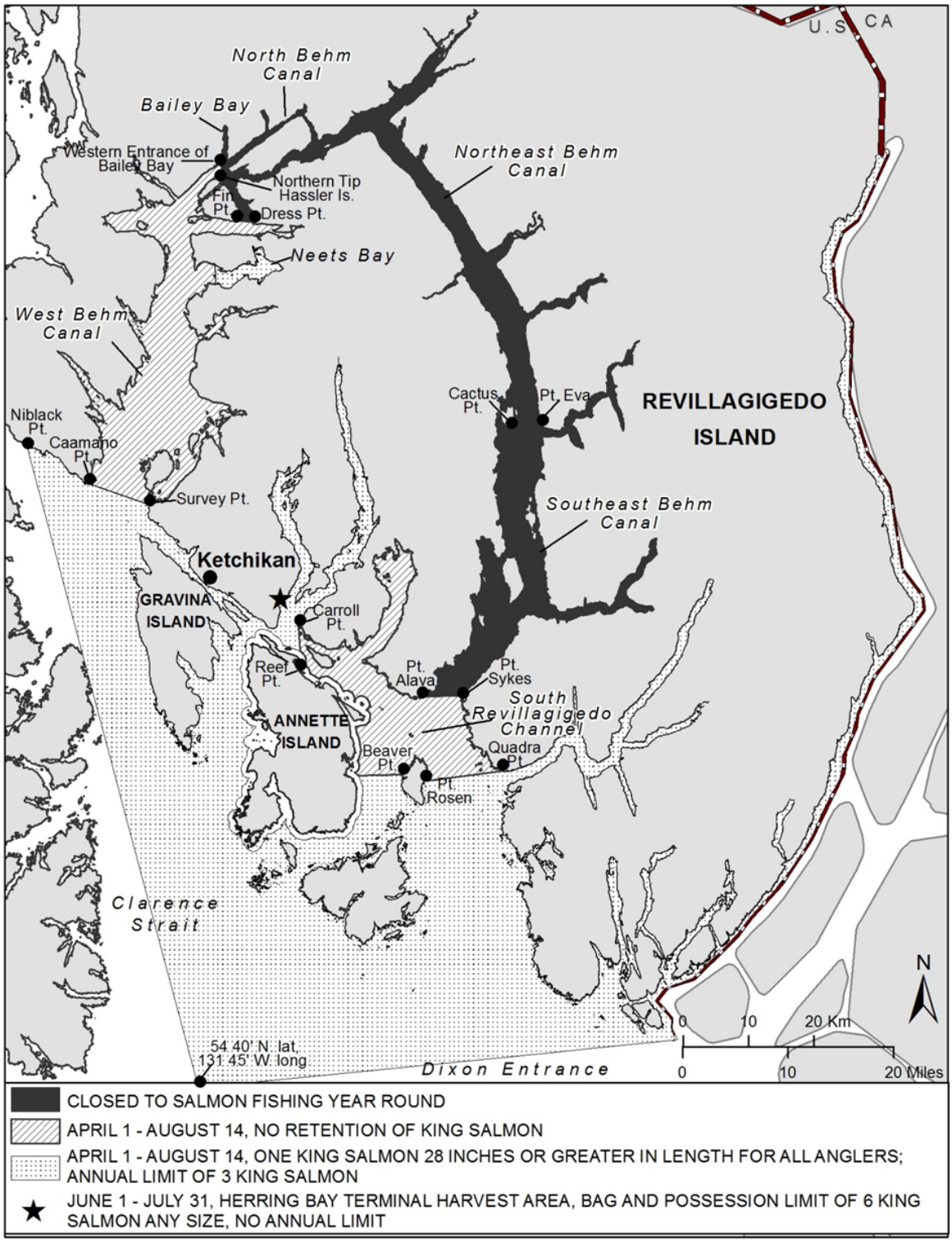
Appendix A3.–Map depicting the 2017 regulations implemented by EO and proposed sport fishery regulations and boundaries under Option A to protect Unuk River king salmon. Presented to the board and public for consideration at the January 2018 Southeast and Yakutat regulatory meeting.



Appendix A4.–Map depicting proposed sport fishery regulations and boundaries under Option B to protect Unuk River king. Presented to the board and public for consideration at the January 2018 Southeast and Yakutat regulatory meeting.



Appendix A5.–Map depicting proposed sport fishery regulations and boundaries under Option C to protect Unuk River king salmon. Presented to the board and public for consideration at the January 2018 Southeast and Yakutat regulatory meeting.



Appendix A6.–Options to reduce harvest of Unuk River king salmon in the personal use fishery. Presented to the board and public for consideration at the January 2018 Southeast and Yakutat regulatory meeting.

ACTION #3–PERSONAL USE FISHERY

Objective: Reduce the personal use harvest of Unuk River king salmon.

Background: The Unuk River lies in the Ketchikan Non-Subsistence Area and has no record of king salmon harvest taken incidentally during permitted personal use fishing. The only personal use fishery in Behm Canal takes place in Yes Bay and has harvested between 2 and 11 king salmon since 2005.

Option A.

Specific Action to Implement the Objective:

1. Prohibit the retention of king salmon in the Yes Bay and Unuk River personal use fisheries.

Benefits: Ensure that no king salmon are harvested as incidental catch.

Detriments: This action will provide little gain in escapement.

Appendix B1.–Substitute language to provide the department the authority to set annual limits by residency in the Southeast Alaska Area king salmon sport fishery.

5 AAC 47.020. General provisions for seasons, bag, possession, annual, and size limits, and methods and means for the salt waters of the Southeast Alaska Area.

(1) king salmon, may be taken from January 1–December 31:

(A) king salmon must be 28 inches or greater in length; the commissioner shall establish bag, possession, and annual limits, by emergency order, as specified in 5 AAC 47.055; a harvest record is required for a nonresident as specified in 5 AAC 75.006;

(B) in times of king salmon conservation, the department may establish annual limits, pursuant to 5 AAC 75.003, for king salmon for residents and nonresidents.

Substitute language to provide the department the authority prohibit retention of king salmon of king salmon greater than 28 inches in length in the commercial salmon purse seine fishery:

5 AAC 33.392. Size limits and landing of king salmon.

…

(b) A CFEC purse seine salmon permit holder may take but may not sell king salmon [BETWEEN THE SIZES OF GREATER THAN 21 INCHES FROM THE TIP OF THE SNOUT TO TIP OF TAIL (IN ITS NATURAL AND OPEN POSITION) AND] less than the legal length size limit specified in (a) of this section. King salmon taken in the purse seine fishery that are less than the legal size limit will not be counted against the king harvest quota;

(g) Notwithstanding (a), if the department determines that it is necessary for the conservation of king salmon or to meet obligations of the Pacific Salmon Treaty, the commissioner may, by emergency order, close the purse seine salmon fishery and immediately reopen the fishery during which king salmon equal to or greater in length than the limits set forth in (a) of this section that are taken incidentally in the purse seine salmon fishery must be returned to the water unharmed;

(h) A person may not mutilate or otherwise disfigure king salmon in any manner that prevents determining the size limits set out in this section.